



Hardy BBT Limited

CONSULTING ENGINEERING & PROFESSIONAL SERVICES



PINCHER CREEK WEST AREA
LEVEL III
LAND IRRIGABILITY CLASSIFICATION



Prepared for:

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ALBERTA ENVIRONMENT

Prepared by:

HARDY BBT LIMITED

CALGARY

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ABSTRACT

The purpose of this project is to conduct a Land Irrigability Classification for the Pincher Creek West area. This area is comprised of approximately 32,800 ha (81,000 acres) within the Municipal District of Pincher Creek (No. 9). It includes lands within the townships of 6-1, 7-1, 7-2, 8-1, and 8-2, W5 and 6-30, 7-30, and 8-30, W4. The classification was conducted in accordance with standards for Level III intensity and included field soil mapping, soil profile drilling and sampling, laboratory analysis of the samples, evaluation of the data, and classification of the soil irrigation potential.

The study area lies within the Cardston Plain and the Porcupine Hills Physiographic Divisions. The plains are generally very gently to moderately sloping. The topography in the hills region is controlled by sandstone and to a lesser degree, shale bedrock. The soil parent material on the plains is compromised principally of glacial lacustrine or lacustro-till deposits which have high clay contents (45-70% clay). Clay loam to clay textured till or lacustro-till are the dominant soil parent materials in the hills area. Coarser textured glacial fluvial deposits are found in T7 R2 W5, above the Crowsnest River. Fluvial lacustrine deposits occur in T8 R1 W5 west of the Oldman River.

The continental climate of the area is characterized by cold winters and warm summers. Average annual precipitation is approximately 500 mm. Chinook winds are common in the Pincher Creek area. The majority of the study area is under dryland agriculture. The native pasture land in the area is typically fescue grass prairie.



The Rego and Calcareous subgroups of the Black Chernozem great groups are dominant in the study area. Eroded phases of these soils comprised most of the cultivated soils investigated. Other chernozemic Subgroups were also noted together with soils in the Gleysolic and Regosolic Orders.

Approximately one half of the study area (53%) was rated irrigable within land classes 2 to 4. Class one land was not mapped in the area. Forty eight (48) percent of the study area was rated as land Class 3 with moderately severe soil and topographic limitations. Soil limitations for irrigation were typically a result of fine soil textures (clayey to heavy clayey), high lime content (calcareous or rego profile development) and/or topsoil loss due to wind erosion. Approximately 3% of the study area was rated Class 2, with only moderate limitations.

The majority of the soils in the block would require low application rates of irrigation water to minimize surface runoff (hence erosion) and downslope salinization due to lateral movement of dissolved salts.



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1.0 INTRODUCTION

1.1 BACKGROUND

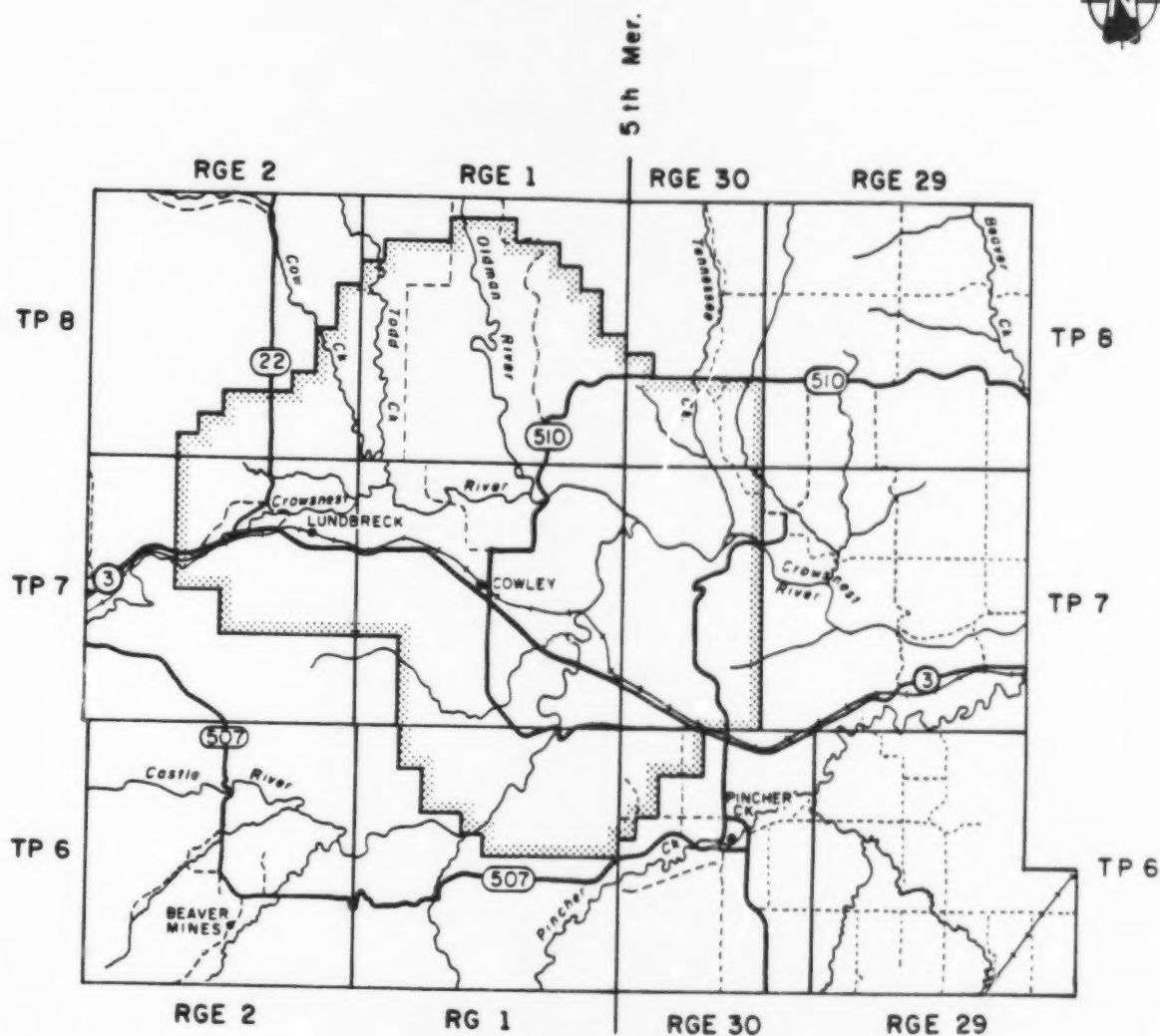
The Planning Division of Alberta Environment requested Hardy BBT Limited to conduct a Land Irrigability Classification for the Pincher Creek West Area. The classification area is located within a block that includes lands in the Townships 6-1, 7-1, 7-2, 8-1, and 8-2, W4 and 6-30, 7-30, and 8-30, W4 (Figure 1).

Existing sources of relevant information were incorporated into the classification, and included federal soil survey information for the Pincher Creek/Crownest Pass Municipalities (Walker and Brierly, 1986).

1.2 PURPOSE OF THE PROJECT

The purpose of the project is to investigate and inventory the suitability of land for irrigation. Specifically, the purpose is to:

- (1) Identify and rate lands for their suitability for irrigation;
- (2) Describe and characterize the land within the area investigated;
- (3) Identify potential impacts of irrigation which may occur; and
- (4) Recommend appropriate soil and water management practices.



SCALE
1:250 000



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**LOCATION MAP
PINCHER CREEK WEST
STUDY AREA**

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FIG. 1

HT83-87



1.3 SCOPE OF THE PROJECT

The classification is a Level III, medium intensity investigation, as outlined in the project terms of reference and defined by Alberta Agriculture (1983).

The overall investigation was managed by P.G. Karkanis, of Alberta Agriculture. Hardy BBT Limited was responsible for project supervision, field checking, land classification, and cartography. Drilling, logging and sampling was subcontracted to Agri Gro Custom Soil Sampling and Double D Drilling, and analytical analysis to Chemex and Lakeside Labs.

Soil descriptions and terminology are consistent with the Canada Soil Survey Committee (1978) and Dumanski (1978).



2.0 METHODS

The classification was conducted at a Level III intensity as described by Alberta Agriculture (1983).

2.1 FIELD INVESTIGATION

In compliance with the terms of reference, verbal authorization and consent was received from land owners or tenants prior to the commencement of the field investigation. The field program consisted of two components:

- mapping and checking; and
- drilling, logging and sampling.

Stereo air photos were reviewed prior to field checking. Soil and land irrigability classification boundaries were delineated and confirmed in the field. Areas excluded from detailed examination because of their obvious non-irrigable status included coulees, wetlands and steeply sloped bedrock ridges. On average, a minimum of 4 holes were drilled and sampled per section of potentially irrigable land as required in the terms of reference. As well, 8 additional shovel/auger checks per section were made by a soil agrologist. Recent Agriculture Canada soil survey information (Walker and Brierly, 1986) was used, resulting in a total inspection density of approximately 16 sites per potentially irrigable section.

Inspection sites, soil and topographic boundaries, and cultural features were plotted on a 1:20 000 scale township



photo. Site data was recorded onto field sheets and included parameters such as soil classification, horizon sequence, depth and texture, parent material, drainage, vegetation and subgroup and parent material distribution within the landscape.

During the field checking, classification boundaries were delineated, and representative drilling sites selected. The drill sites were plotted onto the 1:20 000 scale township photo and forwarded to the drilling team.

Drilling was carried out between September 9 and December 7, 1986. Three holes per section were drilled, logged and sampled to 2 m. One hole per section was drilled, logged and sampled to 3 m. Samples and horizons were logged onto sheets provided by Alberta Agriculture.

At least 3 samples were collected from each site, at depths of 0 to 50, 50 to 100, and 100 to 200 cm. Additional samples were taken when required, below 2 m on the augered holes to 3 m. The samples were placed in clean plastic bags, labelled and forwarded to Chemex Labs (Calgary) for analysis.

2.2 LABORATORY ANALYSIS

Each sample was dried, ground and analyzed using standard analytical techniques for salinity which included pH, electrical conductivity (E.C.), saturation percent, and soluble cations required for the Sodium Adsorption Ratio (SAR) calculation. Ten percent of the samples were selected for mechanical analysis. An additional ten percent of the samples



were split and forwarded to Lakeside Labs (Brooks) for checks of analytical accuracy. Laboratory data are presented under a separate cover.

2.3

DATA EVALUATION AND IRRIGABILITY CLASSIFICATION

Drill logs, analytical chemistry and field sheets were used in the evaluation of the soil delineations. Each mapped soil delineation was subdivided into its various soil subgroups. A basic soil rating (BSR) was calculated for each soil subgroup profile occurring within a delineation. The soil subgroup BSR was proportioned according to its extent of occurrence within the landscape, and modified where applicable because of salinity. The partial soil ratings index for each subgroup profile were added to give the final soil rating and category.

The topographic category is assigned on the basis of surface features, dominant or limiting slope class, stoniness and brush or tree cover. These affect the ease of irrigation, the size and shape of the field as well as the suitability and type of irrigation system that can be used. The soil and topographic ratings are then combined to assign the appropriate Irrigability Land Class.

2.4

MAP CONVENTIONS

Map symbols are consistent with Alberta Agriculture (1983). For land topographically suited for irrigation the map symbol is composed of two component parts. The landscape description includes the soil subgroups, parent material, texture, topography and surface expression, and soil chemistry. The



interpretive land class symbol is derived from the landscape description.

It is important to note that the soil, landscape and limitation annotations are a simplification of the real landscape in that only dominant and highly contrasting members are noted on the map.

The soil taxonomy descriptions are usually a complex, to a maximum of three soil subgroup profiles. Soil and topographic limitations in the land class symbol are kept to a maximum of the three most limiting factors. Soil and topographic limitations are displayed in order of importance and follow a single drainability class.



3.0 DESCRIPTION OF THE PROJECT AREA

3.1 GEOGRAPHIC LOCATION, SIZE AND ACCESS

The study area includes approximately 30,000 ha (80,000 acres) within the Municipal District of Pincher Creek (No. 9). The area is accessed by secondary road #22 and Provincial Highway #3 (Figure 1).

3.2 PHYSIOGRAPHY, RELIEF AND SURFACE DRAINAGE

The study area lies within the Cardston Plain and Porcupine Hills Physiographic Divisions (Pettapiece, 1985). The area is dissected by coulees and valleys associated with the three rivers which converge to form the Oldman River in townships 7-1 W5M and 7-30 W4M. The plain is generally very gently to gently undulating, whereas the hills and ridges are generally gently to moderately sloping. Elevations range from approximately 1020 m a.s.l. in the Oldman River Valley to 1470 m a.s.l. on a ridge in the northern portion of the study area. Drainage is into the Castle, Crowsnest, and Oldman Rivers via Tennessee, Connelly, Cow, and Todd Creeks and numerous minor streams.

3.3 SURFICIAL AND BEDROCK GEOLOGY

The dominant materials in the study area are mapped as lacustrine and lacustro-till (Alley and Harris 1974; Walker and Brierley, 1985). Lacustrine deposits from glacial lakes are located between ridge features in the plain region. Lacustrine materials are generally uniform and stone free except for the soil surface which is typically slightly stony, probably a result of stone and cobble ice rafting. Less



uniform materials deposited under fluctuating water conditions (lacustro-till) are found in broad bands along the plain edge where very gently undulating topography meets bedrock controlled ridges. Lacustro-till deposits are characterized by a slightly to moderately stony surface. Coarser textured glaciofluvial deposits are found adjacent to the Crowsnest River. Basal glacial till deposits are found on ridges and plateaus throughout the study area.

The plains region of the study area lies on the Willow Creek formation of the Paleocene and upper Cretaceous age (Green 1979). This formation is a succession of nonmarine pale grey fine grained calcareous sandstone; grey, green and pink bentonitic mudstone with abundant white weathering calcareous concretions; and thin limestone beds. A small portion of the northeast corner of the study area lies on the Porcupine Hills formation which is comprised of nonmarine pale grey, thick bedded, cherty, calcareous sandstone and pale grey calcareous mudstone (Green 1970). Bedrock outcrops are common in the ridge areas of Tp. 8, Rg. 1. Bedrock depths are generally greater than 3 m except on ridges and plateaus. A small portion of the western side of the study area (Tp. 7, Rg. 2) lies on the Rocky Mountain Foothills. This area is characterized by moderate to steep slopes controlled by near surface bedrock.

3.4 CLIMATE AND NATIVE VEGETATION

The climate of the area is a continental type with cold winters (mean January temperatures, Cowley -10.1°C) and warm summers (mean July temperatures, Cowley 15.8°C , Table 1). Annual precipitation is 515.3 mm at Cowley (Table 2), June



TABLE 1
MEAN DAILY TEMPERATURES
(°C)
For the Period From 1950 to 1980
Cowley, Alberta

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<u>Cowley</u>											
-10.1	-5.1	-2.9	3.2	8.7	12.5	15.8	14.9	10.8	6.1	-1.5	-6.1
YEAR = 3.9											
<u>Cowley Airstrip</u>											
-10.4	-5.6	-2.9	3.0	8.9	13.1	16.0	15.2	10.7	5.8	-1.9	-6.5
YEAR = 3.8											

Reference: Environment Canada, 1982



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TABLE 2

MEAN MONTHLY PRECIPITATION

(mm)

For the Period From 1950 to 1980
Cowley, Alberta

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<u>Cowley</u>											
41.4	32.9	36.6	52.6	62.6	72.6	40.5	48.0	37.9	25.1	32.6	32.5
YEAR = 515.3											
<u>Cowley Airstrip</u>											
38.8	34.0	26.9	41.4	57.4	78.1	39.9	49.3	37.4	22.8	27.9	43.2
YEAR = 497.1											

Reference: Environment Canada, 1982



being the wettest month with 14.1% of the annual precipitation. Winds in the area are dominantly from the west and west-southwest (Tables 3 and 4). Chinook winds are common; the area receives in excess of 30 chinook wind days per year (Strong and Leggat, 1981). The area is located in the Fescue Grass Ecoregion (Strong and Leggat 1981). The dominant native vegetation is rough fescue (Festuca scabrella) with secondary quantities of Parry oat grass (Danthonia parryi), june grass (Koeleria macrantha), chickweed (Stellaria sp.), sticky geranium (Geranium viscosissimum), lupines (Lupinus sp.), yellow bean (Thermopsis rhombifolia), sage (Artemesia sp.), yarrow (Achillia sp.), bedstraw (Galum sp.), and fleabanes (Erigeron sp.). Areas of undisturbed native vegetation are limited to rough broken areas such as coulees, riverbanks and on undeveloped road allowances.

3.5 CURRENT LAND USE

Land use within the study area includes dryland agriculture, irrigation agriculture, native pastureland and wetland, water bodies and river valley bottoms. About 45% of the area is occupied by coulees, ridges, river banks and other steep features. Approximately 55% of the land area is cultivated or has been cultivated at one time. Of the dryland farm areas, approximately 30% of the land is in fallow. Strip cropping is practiced in an effort to protect against wind erosion, preserve moisture and control weeds. Commonly grown dryland crops include spring wheat, winter wheat, and barley. Alfalfa is a common forage crop.



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Only a very small portion of the land in the study area is presently irrigated.

Pasture lands are generally restricted to moderately sloping areas, river and creek valleys, and on ridges and plateaus.



4.0

SOIL DEVELOPMENT PROCESS AND LANDSCAPE FEATURES

The Orthic Black Chernozem is the zonal soil in the classification area. Other soils which occur in the area have been affected by processes such as erosion, gleying, leaching or chemical accumulation. The resulting soil types include the Gleysolic and Regosolic soil orders in addition to other Chernozemic subgroups. Rego and Calcareous Chernozemic profiles occur more frequently than do Orthic Chernozemic profiles in the study area.

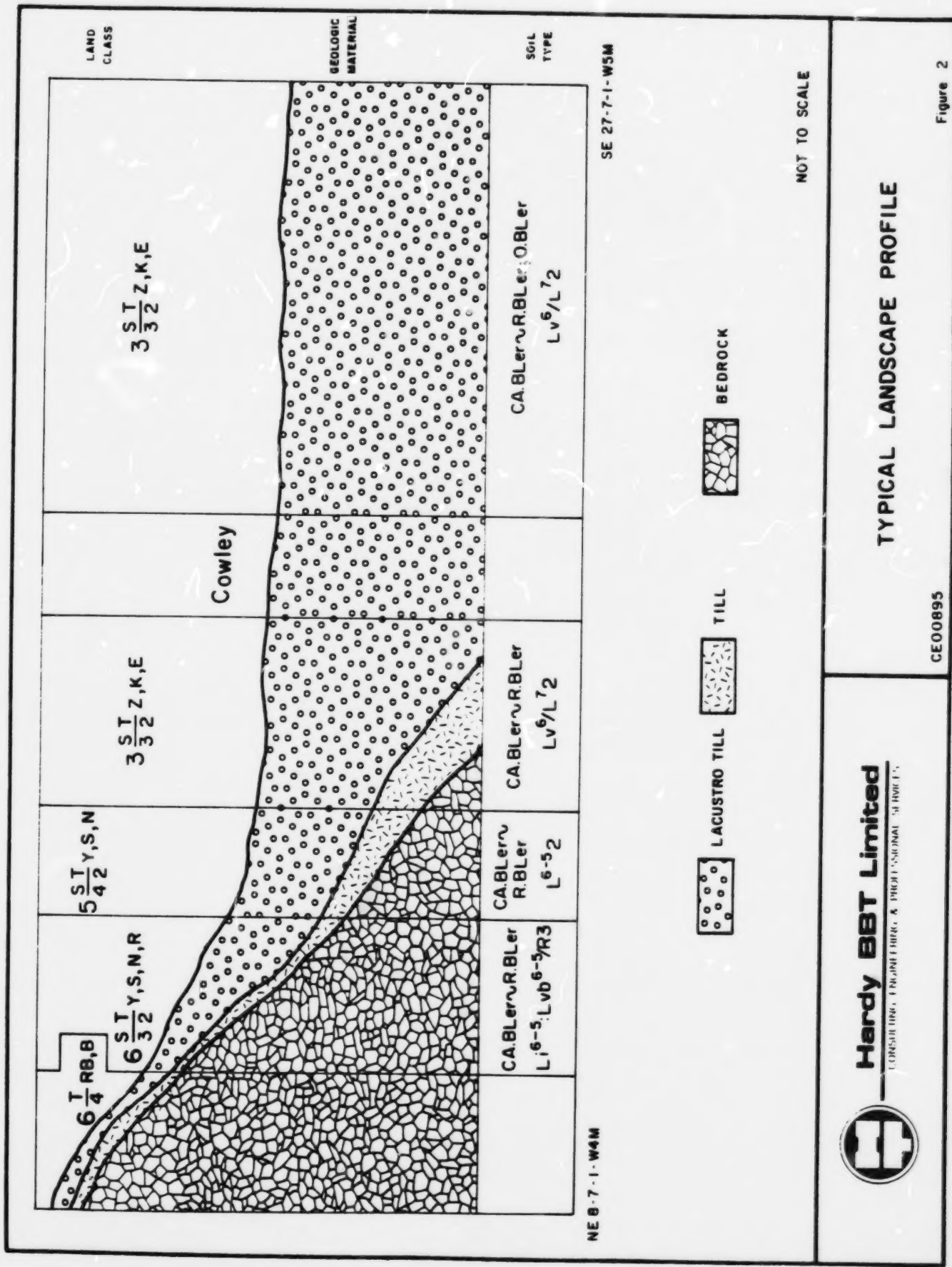
4.1

GENETIC MATERIALS AND TOPOGRAPHY

Although lacustrine, lacustro-till and glacial till parent materials have been mapped as discrete map units, these soil parent materials often are intermixed in a particular landscape. The study area was affected by both continental and mountain glaciation processes (Alley and Harris, 1974). In townships 6 and 7 lacustrine and lacustro-till materials are often intermixed possibly as a result of superglacial ponding and deposition. As a result, areas of lacustro-till outcrop within areas indicated to be lacustrine. From a practical stand point this occurrence is of little consequence since both lacustrine and lacustro-till materials are characterized by texture in the range of clay to heavy clay.

Figures 2 and 3 show some typical landscape profiles within the study area.

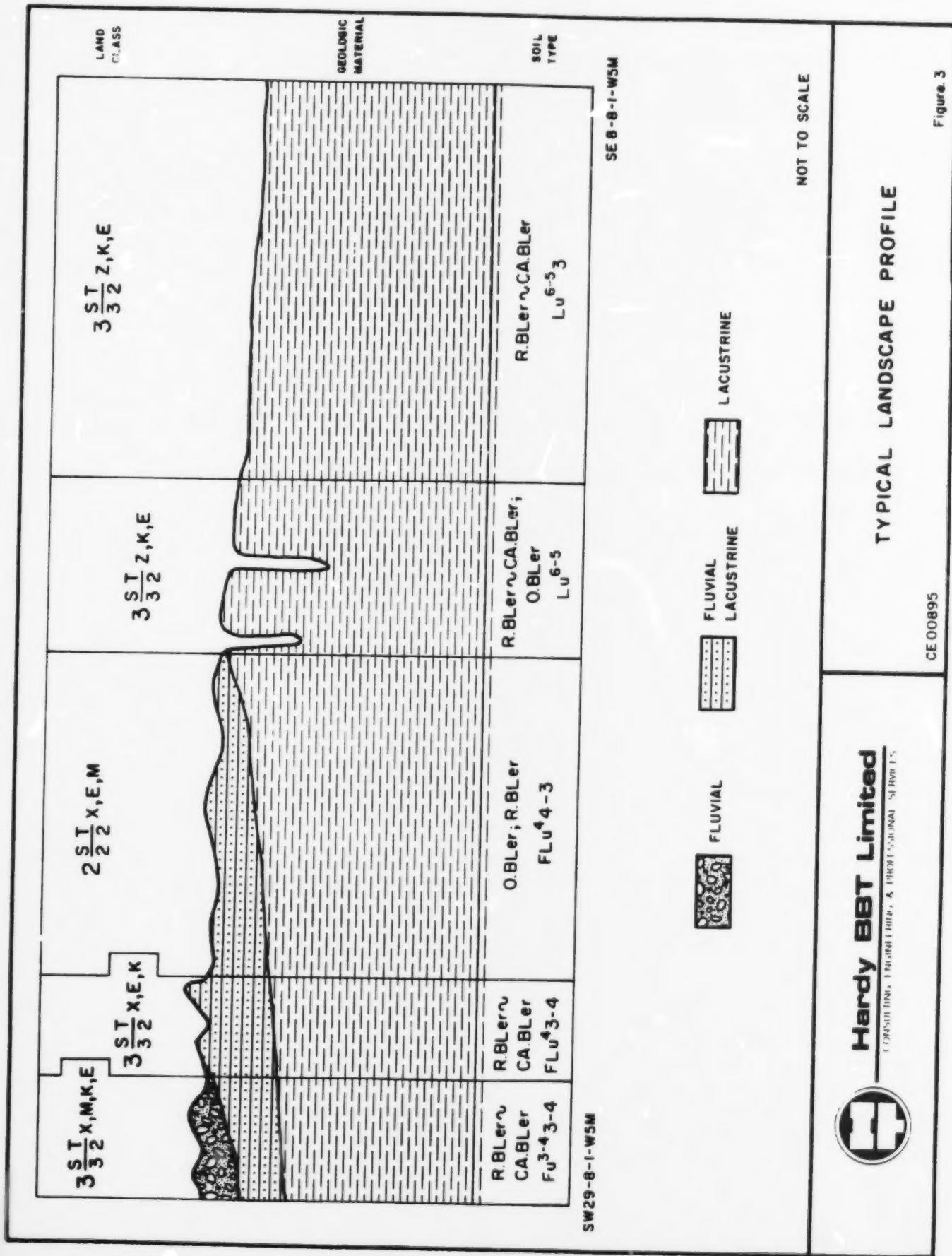
Within the topographic delineation of a particular map unit, there may be inclusions or significant amounts of other slope



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TYPICAL LANDSCAPE PROFILE





classes other than the one or two indicated on the map. Either the dominant or most limiting topographic class or classes are expressed. As with genetic materials, it is not always possible to delineate these areas at the Level III scale of mapping.

In map units where significant amounts of contrasting soils or topographic classes occur (other than the dominant member), both dominant and significant members of the complex map unit have been included in the calculation of the irrigability rating.

4.2 SOIL DESCRIPTIONS

The typical Orthic Black Chernozem found in the study area has the following horizon sequence: Ap (or Ah in native pastureland), Bm, Ck. The A horizon is the topsoil and is characterized as being black in colour due to organic enrichment from the decomposition mainly of grass roots, leaves and stems. On undisturbed sites the Ah horizon is, on average, 15 cm thick, and in cultivated fields, the Ap horizon thickness ranges from 10 to 20 cm but averaging 12 cm.

The Bm horizon is usually reddish brown to dark yellowish brown in colour. It has not been altered significantly by any process other than the leaching of lime and oxidation of iron. On some soils there may be a weakly expressed Bt horizon, that is, a B horizon that has been enriched by eluviated clay. The Bm horizon thickness varies depending on slope position and steepness. On relatively level areas the Bm horizon typically extends to a depth of 30-45 cm. On steeply sloping areas the



Bm horizon may be as thin as 5 cm. The Ck horizon underlies the Bm horizon.

The Ck horizon is basically unaltered parent material that has been very slightly modified by the enrichment of lime leached from the upper horizon but not modified enough for it to be considered a Cca horizon. Typically the colour of the Ck horizon is yellowish brown to light olive brown. The presence of gypsum crystals and/or coal specks is common at depths below 1 m, particularly in lacustro-till deposits.

Cca horizons are common in Chernozemic profiles but are not that common in the study area. When present they occur between the Bm and Ck horizons. The Cca horizon is characterized by its very pale brown to light yellowish brown colour, a result of lime enrichment.

Rego and Calcareous Black Chernozemic profiles are the most common in the study area as a result of past erosional processes. The lower portion of the profile in these soils is similar to that described above for Orthic profiles. However, severely eroded soils often lack a true A or B horizon because of removal by wind. Consequently, the severely eroded profile is generally characterized by a surface ACpk horizon of 10 to 12 cm with little or no color difference from the underlying Ck. In some severely eroded fields of township 7-1, it is estimated that as much as 50 cm of soil has been removed by wind. These fields are characterized by a ridge-valley microtopography indicating past attempts at erosion control through strip cropping. Ridges in these fields are typically spaced at 50 m intervals, oriented north-south, with local



relief of 0.5 to 1.0 m. Ridges are probably a result of soil deposition along former strip edges, while depressions between ridges are blow out areas.

Orthic Humic Gleysols are generally found in the lowest landscape positions where saturated conditions persist for most of the year. Under certain discharge conditions these Gleysols may be saline or sodic.

Solonetzic soils were not classified in the study area.

4.3 SOILS DEVELOPED ON LACUSTRINE AND LACUSTRO-TILL DEPOSITS

Fine to very fine lacustrine and lacustro-till deposits are the most common parent material within the study area. These deposits are generally nearly level to very gently undulating and reach depths of 45 m. Calcareous, Rego and Orthic Black Chernozems are the dominant soils developed on these deposits. Parent materials are typically moderately to strongly calcareous, non-saline and non-sodic. Almost all soils developed on these deposits are cultivated.

Soils on lacustrine and lacustro-till deposits generally have high swell-shrink properties. As a result, these soils tend to shrink during dry spells, causing deep wide cracks, and swell during wet spells, resulting in crack closure and soil sealing. Orthic profiles are commonly characterized by narrow wedges of darker surface (Ap) material, extending from the surface down to 20 to 40 cm depths, caused by infilling of cracks during wind or rainstorms.



The typical Orthic Black Chernozem on a lacustrine or lacustro-till deposit has the following characteristics.

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
Ap	0-21	Black (10 YR 2.5/1.5 m), clay, moderate medium granular, friable, plastic, pH 7.1, nonsaline, nonsodic
Bm	21-35	Dark yellowish brown (10 YR 3.0/6 m) clay, moderate medium subangular blocky, firm, plastic, pH 6.6, nonsaline, nonsodic
CK1	35-90	Dark yellowish brown (10 YR 4.5/6 m) clay to heavy clay, massive to medium pseudo blocky, very firm, very plastic, pH 7.9, nonsaline, nonsodic, lacustrine
CK2	90+	Olive brown (2.5 Y 4/4 m) heavy clay, massive, very firm, very plastic, pH 8.3, nonsaline, nonsodic, lacustrine

If not present to the soil surface, lacustro-till material containing less than 2% cobbles is occasionally encountered with 2 m.

The typical Calcareous Black Chernozem has similar characteristics to the above described profile except for:

- (1) a shallower Ap horizon (i.e. 0-15)
- (2) A Bmk horizon instead of a Bm horizon.

The Bmk horizon is closer in colour to the underlying Ck horizon and contains free carbonate.



The Rego Black Chernozem has similar characteristics to the Calcareous Black Chernozem except for:

- (1) Often a lime rich, less friable Ap horizon; and
- (2) A thin (less than 5 cm) Bmk or Bm or no B horizon.

4.4 SOILS DEVELOPED ON GLACIAL TILL

Glacial till deposits are primarily associated with bedrock controlled ridges, plateaus or hilly topography. Orthic and Calcareous Black Chernozems are the dominant soils developed on these deposits. The till in the area is moderately to strongly calcareous and typically nonsaline and nonsodic.

The typical Orthic Black Chernozem on a glacial till deposit has the following characteristics. (Note these soils are common to native pasture lands).

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
Ah	0-23	Black (10 YR 2.5/1.5 d), clay loam, moderate medium granular, friable, slightly plastic, pH 6.8
Bm	23-40	Strong brown (7.5 YR 4.5/6 m), clay to clay loam, moderate subangular blocky, friable, slightly plastic, pH 6.6
Ck	40-150	Dark yellowish brown (10 YR 4.5/6 m) clay, massive, firm, plastic, pH 7.8
R	150+	Sandstone



4.5 SOILS DEVELOPED ON GLACIO FLUVIAL DEPOSITS

Glaciofluvial soil parent materials are deposited by glacial meltwater; the energy of which determine the texture and coarse fragment content. Soils developed on medium textured, gravel free deposits have good irrigation potential. The dominant soil development on glaciofluvial deposits in the study area is Calcareous Black Chernozemic. A typical profile developed on a coarse fragment free deposit has the following characteristics.

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
Apk	0-15	Dark brown (10 YR 4/2 d), fine sandy loam, weak fine granular to single grain, very friable, nonplastic, pH 7.3
Bmk	15-28	Yellowish brown (10 YR 5/4 m) loamy fine sand, single grain, loose, nonplastic, pH 7.3
CK1	28-50	Yellowish brown (10 YR 5/4 m) fine sandy loam, massive, friable, nonplastic, pH 7.5
CK2, 3, 4, etc.	50+	Colour, pH and structure remain relatively constant. Stratigraphy is typically variable and soil texture ranges from fine sand to very fine sandy loam.



5.0

LAND IRRIGABILITY CLASSIFICATION

Within the Pincher Creek West Block area, 8 land classes and subclasses were identified. Approximately 53% of the study area (17335 ha) is mapped as irrigable within classes 2 to 4. Another 710 ha (1770 ac) are non-irrigable pending more detailed investigation. Table 3 lists the land classes and the limitations occurring within the Pincher Creek West area and Table 4 shows the area of land irrigability classes for each township.

5.1

LAND CLASS 2 $\frac{ST}{22}$

This land class has moderate soil and topographic limitations that restrict irrigation land use. These areas occur on coarse to medium textured deposits, on very gently to gently (2-9% slopes) undulating topography. The soils are dominantly Calcareous Black and Orthic Black Chernozems that are moderately permeable, and well drained. Soil limitations are low moisture holding capacity and/or high lime content. There is a significant portion of soils with shallow profile development.

The topographic limitation restricts these soils to sprinkler irrigation methods only. Water application should take into account the potential for ponding in depressions, soil erosion and the flushing of salts to adjacent areas. The possibility for perched water tables and lateral movement of salts also exists. Infiltration rates are moderate, therefore light frequent application of water may be necessary.



5.2 LAND CLASS $3\frac{ST}{32}$

This land class has moderately severe soil and moderate topographic limitations that restrict the use of these areas for irrigation. These soils occur predominantly on fine to very fine textured lacustrine and lacustro-till materials. These material types are associated with very gentle to gently sloping (2-9%) undulating topography. Common soil limitations are listed in Table 5.

The soils are mostly classified as well to moderately well drained Rego, Calcareous and Orthic Black Chernozems. The soils are typically slowly permeable.

These soils are suitable only for sprinkler irrigation methods. The emphasis of water management in this land class should be to control salinity or sodicity problems downslope, and minimize soil erosion.

5.3 LAND CLASSES $4\frac{ST}{23}$ AND $4\frac{ST}{33}$

These classes have both soil and topographic limitations that restrict irrigation land use. The soils occur on moderately fine to fine textured glacial till and fine textured lacustro-till deposits on moderate to strongly sloping (5-15% slopes) rolling and hummocky topography. The soils are dominantly Rego and Orthic Black Chernozems with significant amounts of shallow soils that are slowly to moderately permeable,



depending on depth to bedrock. The soils are moderately well to well drained, nonsaline and nonsodic.

Soil limitations in these areas include shallow profile development, shallowness to bedrock, fine soil textures and/or high free carbonate content. The presence of steep slopes would limit irrigation to the use of specialized sprinkler systems designed to operate on rough ground and minimize runoff and water erosion. The potential exists for ponding of water in depressional areas on the finer textured soils if excessive amounts of water are applied. A permanent forage crop may be the best crop to grow on this land class under irrigation.

5.4 LAND CLASS 5ST₄₁

This class is nonirrigable due to severe soil limitations. Soils may be upgraded to an irrigable class pending a more detailed investigation and/or implementation of improvement practices. Soils are placed in class 5 if more than 30% of the soils within the map unit have properties that exclude them from other irrigable classes mainly due to the following: excessive wetness, salinity, sodicity, or shallowness to bedrock. The provision of surface or subsoil drainage for wetlands, and flushing of salts may allow these soils to be classed as irrigable.

The extent of bedrock in some areas may need to be better defined by more drilling. A more intensive investigation may show that shallow bedrock is not a severe limitation,



depending on its contour and topography. A permanent forage crop may be the best crop to grow on such soils if they are irrigated.

5.5 LAND CLASSES $6\frac{ST}{42}$ AND $6\frac{ST}{43}$

Soils in this land class are nonirrigable due to very severe limitations because of salinity, sodicity, gravel, shallowness to bedrock or excessive wetness.

5.6 LAND CLASS $6\frac{T}{4}$

These lands are nonirrigable due to steep slopes (greater than 20%), rough broken lands, excessive stones or brush cover.

TABLE 3
SOIL AND TOPOGRAPHIC LIMITATIONS
FOR EACH LAND CLASS
IN THE PINCHER CREEK WEST AREA

Irrigability, Land Class and Sub Class							
<u>2ST</u>	<u>3ST</u>	<u>4ST</u>	<u>4ST</u>	<u>5ST</u>	<u>6^T</u>	<u>6ST</u>	<u>6ST</u>
22	32	23	33	42	4	42	43
E	K	E		SN	R	M	R
EK	E	EK	R	KEN	RB	S	MK
EM	EK	KEG	EK	KSE	RBR	R	RG
MK	MK		KG		RBE	W	
	RK				RBW	MB	
	ME					RE	
	EMK					SN	
	KRE					KE	
	KES					MK	
	KEN					WS	
						WI	
						ME	
						RK	
						NKS	
						NKE	
						SKG	
						SNR	

Area*

ha	1010	15595	465	265	710	8960	4840	415
ac	2490	38540	1150	655	1755	22145	11960	1025

Limitations:

- E = eroded
- S = salinity
- R = shallowness to bedrock
- RB = rough broken
- I = periodic flooding
- K = shallow profile development
- M = low moisture holding capacity
- N = sodicity
- W = excessive wetness
- G = steep slopes
- B = bush/tree cover

* Waterbodies and other lands occupy 55 and 465 ha respectively, for a total of 32780 ha (81000 ac).

TABLE 4
LAND IRRIGABILITY CLASSES AND AREAS
PINCHER CREEK WEST
hectares (acres)

Land Class	Township-Range								Total	%
	6-30	6-1	7-30	7-1	7-2	8-30	8-1	8-2		
<u>Classified Lands</u>										
<u>2ST</u> 22	0	325	0	50	0	0	635	0	1010	3.0
Subtotal	0	325 (800)	0	50 (120)	0	0	635 (1570)	0	1010 (2490)	3.0
<u>3ST</u> 32	595	1655	2750	4220	855	1030	3135	1355	15595	47.8
Subtotal	595 (1470)	1655 (4090)	2750 (6790)	4220 (10430)	855 (2110)	1030 (2550)	3135 (7750)	1355 (3350)	15595 (38540)	47.8
<u>4ST</u> 23	0	0	130	0	0	0	335	0	465	1.4
<u>4ST</u> 23	0	0	0	40	0	30	145	50	265	0.8
Subtotal	0	0	130 (320)	40 (100)	0	30 (80)	480 (1180)	50 (130)	730 (1810)	2.2
<u>5ST</u> 42	0	95	0	600	0	10	5	0	710	2.1
Subtotal	0	95 (240)	0	600 (1490)	0	10 (30)	5 (10)	0	710 (1770)	2.1
<u>6^T</u> 4	60	565	1075	2000	1935	415	2550	360	8960	27.3
<u>6ST</u> 42	0	550	815	1710	870	130	575	190	4840	14.8
<u>6ST</u> 43	0	0	0	160	215	35	5	0	415	1.2
Subtotal	60 (150)	1115 (2760)	1890 (4670)	3870 (9560)	3020 (7460)	580 (1430)	3130 (7730)	550 (1350)	14215 (35110)	43.3
TOTAL									32260 (79720)	98.4
<u>Unclassified Lands</u>										
Open Water	0	30	5	10	0	5	5	0	55 (140)	0.2
Other Lands	100	60	65	160	80	0	0	0	465 (1160)	1.4
TOTAL									520 (1300)	1.6
GRAND TOTAL									32780 (81000)	100.0

NOTE: All values for areas are rounded to the nearest 5 units. Inconsistencies between hectares and acres are due to rounding.



6.0

EFFECTS OF IRRIGATION ON SOILS AND WATER MANAGEMENT
REQUIREMENTS

Irrigation agriculture can be sustained on approximately half of soils in the Pincher Creek West area. The potential exists for salinization if excessive amounts of water are applied to lands bordering bedrock controlled hills and ridges.

On some of the soils adjacent ridge features, salinity exists within the root zone (soil limitation S). High water application rates may flush these salts downward and improve the upper soil quality. However, the potential exists for lateral movement of these salts downslope to discharge into local depressions or lands with good irrigation potential.

Fine to very fine textured soils occur extensively throughout the area. These soils are developed either on lacustrine or lacustro-till deposits. In all cases these soils have relatively low infiltration rates. The potential for water erosion and ponding will be increased under high rates of water applications on these soils.

The presence of shallow bedrock (R limitation) also provides an impermeable barrier which may channel water laterally carrying salts or create a subsurface water table at a shallow depth.

The coarse textured glacio fluvial soils overlie finer materials that are non-saline or non-sodic. These soils (land class 2) would require light, frequent applications of water. Losses of nutrients, particularly nitrogen would likely occur



through leaching if excessive water is applied. Water applications should be such that adequate root zone moisture levels are maintained during the growing season. Excess water may perch above impermeable layers resulting in either a zone of waterlogged soil or lateral movement of water and soluble salts that may discharge downslope.

The coarse textured soils are also potentially erodible by wind. As a result the more intensive farming that goes along with irrigation development should include special conservation practices such as conservation of stubble, wind breaks or growing of perennial forage crops in rotation to minimize wind erosion losses.



7.0

RECOMMENDATIONS

The following recommendations are made on the basis of information gathered during this study:

- (1) The land class should be one of the major criteria considered when prioritizing land for irrigation development. Class 2 land should be given the highest priority, whereas Class 4 land should be given the lowest priority for irrigation development. Class 5 land is non-irrigable, but may have potential for irrigation, pending a more detailed investigation and/or reclamation. Class 6 land is non-irrigable with no potential for irrigation development.
- (2) Careful irrigation management is needed for the fine textured soils to prevent ponding or raising the water table. Applications should be adjusted to compensate for slow infiltration rates. These soils have high swell properties and consequently tend to form deep wide cracks during dry periods, and tend to become relatively impermeable following rainfall.
- (3) Special sprinkler adaptation may be required to increase water use efficiencies in the high wind condition common to the area.
- (4) All of the cultivated land within the study area has been affected by wind erosion. The extent of damage ranges from slight to severe. To reduce further topsoil losses and land degradation, the use of natural and/or



artificial wind breaks should be encouraged. Irrigation of severely eroded lands should be considered as an opportunity not only to increase production but also to improve soil quality through continuous production of deep rooted high residue producing crops such as forages and cereals. Cereal residue should be spread and incorporated rather than removed.

- (5) Canals through coarse textured materials, should be lined to prevent canal leakage and the deterioration of adjacent land.
- (6) Careful irrigation management is needed for the coarse textured soils to meet the consumptive use requirements of most crops and to prevent deterioration of soils as a result of accelerated wind and water erosion. Light, frequent water application may be required.



8.0

REFERENCES

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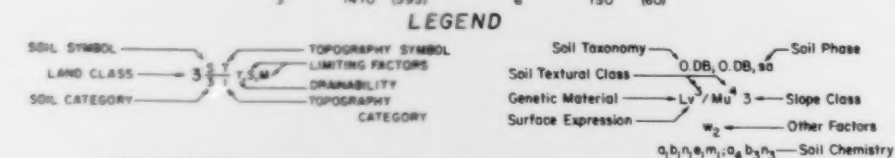
Walker, B.D. and J.A. Brierly. 1986. Unpublished. 1:50,000
Soil Survey of Pincher Creek and Crowsnest Pass
Municipalities. Agriculture Canada Soil Unit. Edmonton,
Alberta.

APP. A



STATISTICAL SUMMARY

LAND CLASS - Acres (hectares)			LAND CLASS - Acres (hectares)		
1	0	(0)	4	0	(0)
2	0	(0)	5	0	(0)
3	1470	(595)	6	150	(60)



LAND CLASSES

- 1: Excellent capability with no significant limitations for irrigation.
- 2: Good capability with moderate limitations for irrigation.
- 3: Fair capability with moderately severe limitations for irrigation.
- 4: Restricted capability requiring a special system design and/or special management.
- 5: Non-irrigable pending detailed investigation, implementation of an improvement and/or undergoing reclamation. Land within this class may be upgraded to an irrigable class or will be rated Class 6.
- 6: Non-irrigable.

SOIL CATEGORIES

- 1. Irrigable-Excellent
- 2. Irrigable-Good
- 3. Irrigable-Fair
- 4. Non-Irrigable

TOPOGRAPHY CATEGORIES

- 1. Irrigable-Gravity
- 2. Irrigable-Sprinkler
- 3. Irrigable-Special System Design
- 4. Non-Irrigable

DRAINABILITY

- X: Moderately to rapidly permeable
- Y: Slowly permeable
- Z: Relatively impermeable

SOIL LIMITATIONS

- D: low permeability/undesirable structure
- R: shallowness to bedrock
- K: shallow profile development
- N: sodicity
- W: excessive wetness
- S: salinity
- M: low moisture holding capacity
- E: erosion damage
- I: periodic flooding

TOPOGRAPHY LIMITATIONS

- F: surface drainage
- G: steep slopes
- J: field size, shape
- B: brush/tree cover
- RB: rough broken
- U: earth moving
- P: stoniness

SOIL TAXONOMY

- B: Brown
- DB: Dark Brown
- DG: Dark Grey
- BL: Black
- G: Gleysol
- HG: Humic Gleysol
- R: Regosol
- HR: Humic Regosol
- SZ: Solonchets
- SS: Salinized Solonchets
- SO: Solonch

SOIL PHASES

- alk: alkaline
- calc: calcareous
- carb: carbonated
- er: eroded
- gr: gravelly
- li: lithic
- sa: saline
- st: stony

GENETIC MATERIAL

- A: Anthropogenic
- C: Colluvial
- E: Eolian
- F: Fluvial
- L: Lacustrine
- M: Moraine (Till)
- R: Bedrock
- S: Saprolite (Residual)
- U: Undifferentiated

SURFACE EXPRESSION

- a: apron
- b: blanketed
- f: fan
- h: hummocky
- i: inclined
- l: level
- m: miring
- r: ridged

TEXTURE

- 0: Gravel
- 1: Sand
- 2: Loamy Sand
- 3: Sandy Loam, Fine Sandy Loam
- 4: Loam, Silty Loam, Very Fine Sandy Loam
- 5: Silty Clay Loam, Clay Loam
- 6: Silty Clay, Clay, Sandy Clay
- 7: Heavy Clay

SLOPE CLASS

- 1: 0 - 0.5
- 2: 0.5 - 2
- 3: 2 - 5
- 4: 6 - 9
- 5: 10 - 15
- 6: 16 - 30

TERMINOLOGY

- Level
- Nearly Level
- Very gentle slope
- Gentle slope
- Moderate slope
- Strong slope

DEPTH TO GROUNDWATER CATEGORY	DEPTH TO BEDROCK (R) OR SAPROLITE (S) CATEGORY	DEPTH (m)
W ₁ < 2	R ₁ S ₁	< 2
W ₂ 1-2	R ₂ S ₂	2-3
W ₃ < 1	R ₃ S ₃	1-2
	R ₄ S ₄	< 1

SALINITY AND SODICITY

- a: salinity between 0 to 0.5 m
- b: salinity between 0.5 to 1 m
- n: sodicity between 0 to 1 m
- e: salinity between 1 to 2 m
- m: sodicity between 1 to 2 m

ABUNDANCE DESIGNATIONS

- n: nearly equal occurrence
- : significant occurrence
- : range
- : minor occurrence

MAP SYMBOLS

- land class boundary
- field boundary
- investigation boundary
- slough or wetland
- disturbed land
- open water
- coulee or low area
- drain
- section corner and number

NOTE: FOR PLANNING PURPOSES ONLY, NOT FOR OBTAINING WATER RIGHTS.

Alberta AGRICULTURE
RESOURCE PLANNING DIVISION

IRRIGABLE LAND INVENTORY IN SOUTHERN ALBERTA

LAND IRRIGABILITY CLASSIFICATION LEVEL III
PINCHER CREEK WEST AREA

Y 8 R 30 W 4 M

SCALE 1:40 000

DATE 1987-03-31

SUBMITTED

DATE

APPROVED

DATE

SIGNED ALBERTA AGRICULTURE

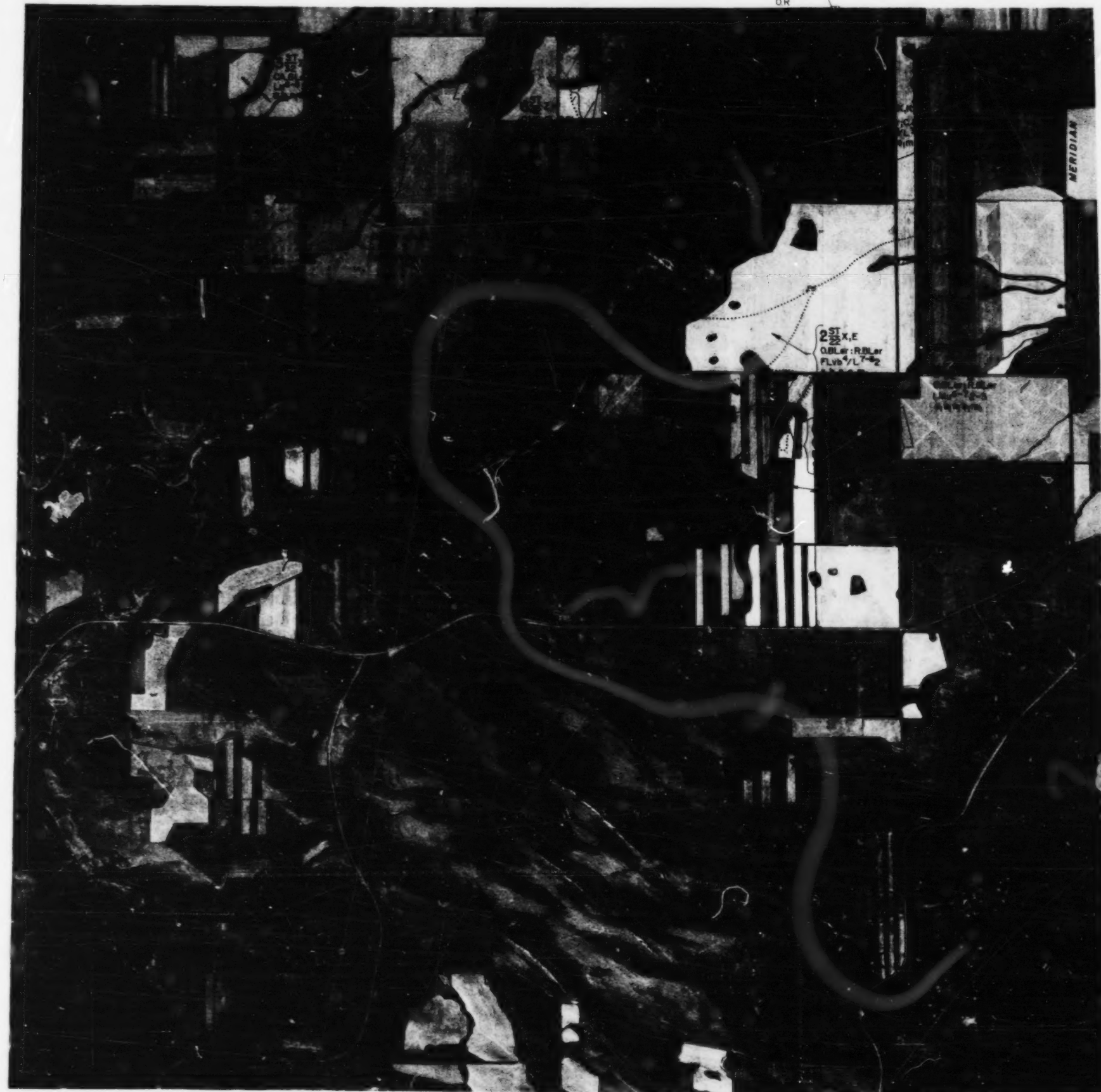
DRAWN B.V.D.F.M.D.

DWG. No. Y-20-L1-10

SHEET 1 OF 8

FILE No. 9344

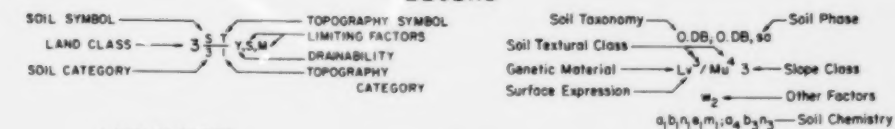
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Hardy (BET) Limited



6ST X, M, B
OR

STATISTICAL SUMMARY			SUMMARY		
LAND CLASS-Acres(hectares)			LAND CLASS-Acres(hectares)		
1	0	(0)	4	0	(0)
2	800	(325)	5	240	(95)
3	4090	(1655)	6	2760	(1115)

LEGEND



LAND CLASSES

- 1: Excellent capability with no significant limitations for irrigation.
- 2: Good capability with moderate limitations for irrigation.
- 3: Fair capability with moderately severe limitations for irrigation.
- 4: Restricted capability requiring a special system design and/or special management.
- 5: Non-irrigable pending detailed investigation, implementation of an improvement and/or undergoing reclamation. Land within this class may be upgraded to an irrigable class or will be rated Class 6.
- 6: Non-irrigable.

SOIL CATEGORIES

- 1. Irrigable-Excellent
- 2. Irrigable-Good
- 3. Irrigable-Fair
- 4. Non-irrigable

TOPOGRAPHY CATEGORIES

- 1. Irrigable-Gravity
- 2. Irrigable-Sprinkler
- 3. Irrigable-Special System Design
- 4. Non-irrigable

DRAINABILITY

- X. Moderately to rapidly permeable
- Y. Slowly permeable
- Z. Relatively impermeable

SOIL LIMITATIONS

- D...low permeability/undesirable structure
- R...shallowness to bedrock
- K...shallow profile development
- N...sodicity
- W...excessive wetness
- S...salinity
- M...low moisture holding capacity
- E...erosion damage
- I...periodic flooding

TOPOGRAPHY LIMITATIONS

- F...surface drainage
- G...steep slopes
- J...field size, shape
- B...brush/tree cover
- RB...rough broken
- U...earth moving
- P...stoniness

SOIL TAXONOMY

- B...Brown
- DB...Dark Brown
- DG...Dark Grey
- BL...Black
- G...Gleysol
- HG...Humic Gleysol
- R...Regosol
- HR...Humic Regosol
- SZ...Solonch
- SS...Solonchized Solonch
- SO...Solonch

SOIL PHASES

- alk...alkaline
- calc...calcareous
- carb...carbonated
- er...eroded
- gr...gravelly
- lit...lithic
- sa...saline
- st...stony

GENETIC MATERIAL

- A...Anthropogenic
- C...Colluvial
- E...Eolian
- F...Fluvial
- L...Lacustrine
- M...Marine (Till)
- R...Bedrock
- S...Saprolite (Residual)
- U...Undifferentiated

SURFACE EXPRESSION

- a...apron
- b...blanketed
- f...fan
- h...hummocky
- i...inclined
- l...level
- m...rolling
- r...ridged

TEXTURE

- 0...Gravel
- 1...Sand
- 2...Loamy Sand
- 3...Sandy Loam, Fine Sandy Loam
- 4...Loam, Silt Loam, Very Fine Sandy Loam
- 5...Silty Clay Loam, Clay Loam
- 6...Sandy Clay Loam
- 7...Heavy Clay

SLOPE CLASS

- 1...0 - 0.5
- 2...0.5 - 2
- 3...2 - 5
- 4...6 - 9
- 5...10 - 15
- 6...16 - 30

PERCENT SLOPE

- Level
- Nearly Level
- Very gentle slope
- Gentle slope
- Moderate slope
- Strong slope

DEPTH TO GROUNDWATER OR SAPROLITE (S)

- W₁ >2
- W₂ 1-2
- W₃ <1

DEPTH TO BEDROCK (R) OR SAPROLITE (S)

- R₁ S₁ >3
- R₂ S₂ 2-3
- R₃ S₃ 1-2
- R₄ S₄ <1

SALINITY AND SODICITY

- a...salinity between 0 to 0.5m
- b...salinity between 0.5 to 1m
- n...sodicity between 0 to 1m
- e...salinity between 1 to 2m
- m...sodicity between 1 to 2m

ABUNDANCE DESIGNATIONS

- ~...nearly equal occurrence
- ...significant occurrence
- ...range
- ...minor occurrence

MAP SYMBOLS

- land class boundary
- field boundary
- investigation boundary
- slough or wetland
- disturbed land
- open water
- coulee or low area
- drain
- section corner and number

NOTE: FOR PLANNING PURPOSES ONLY, NOT FOR OBTAINING WATER RIGHTS.

Alberta AGRICULTURE
RESOURCE PLANNING DIVISION

IRRIGABLE LAND INVENTORY IN SOUTHERN ALBERTA

LAND IRRIGABILITY CLASSIFICATION LEVEL III
PINCHER CREEK WEST AREA

T 6 R 1 W 5 M

SCALE 1:40 000

DATE 1987-03-31

SUBMITTED

DATE 1987-03-31

APPROVED

DATE Mar. 10, 1987

DESIGNED ALBERTA AGRICULTURE

DRAWN B.V.D.F., M.D.

DWG. No. Y-201-LI-18

SHEET 2 OF 8

FILE No. 9345

Prepared by

Hardy SBT Limited

3 ST Z,K,E
32 CABLER, RBLerv.O.
LMu6-53
a₁b₁n₁e₁m₁

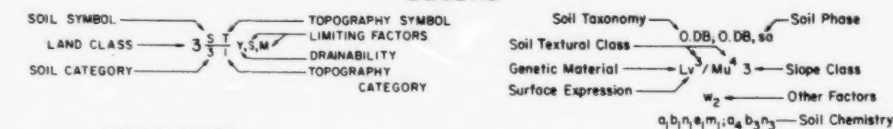
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42 O.R.
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LMu6-53
a₁b₁n₁e₁m₁

4 ST Y,K
32 OBLV, CABL
LMu6-53, LMu6-53, M5-3-5
a₁b₁n₁e₁m₁

STATISTICAL SUMMARY	
LAND CLASS - Acres (hectares)	LAND CLASS - Acres (hectares)
1 0 (0)	4 320 (130)
2 0 (0)	5 0 (0)
3 6790 (2750)	6 4670 (1890)

LEGEND



LAND CLASSES

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- 6: Non-irrigable.

SOIL CATEGORIES

- 1. Irrigable - Excellent
- 2. Irrigable - Good
- 3. Irrigable - Fair
- 4. Non-irrigable

TOPOGRAPHY CATEGORIES

- 1. Irrigable - Gravity
- 2. Irrigable - Sprinkler
- 3. Irrigable - Special System Design
- 4. Non-irrigable

DRAINABILITY

- X. Moderately to rapidly permeable
- Y. Slowly permeable
- Z. Relatively impermeable

SOIL LIMITATIONS

- D... low permeability/undesirable structure
- R... shallowness to bedrock
- K... shallow profile development
- N... sodicity
- W... excessive wetness
- S... salinity
- M... low moisture holding capacity
- E... erosion damage
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- G... steep slopes
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- B... Brown
- DB... Dark Brown
- DG... Dark Grey
- BL... Black
- G... Gleysol
- HG... Humic Gleysol
- R... Regosol
- HR... Humic Regosol
- SZ... Solonchets
- SS... Solonchets
- SO... Solonchets

SOIL PHASES

- O... Orthic
- R... Rego
- CA... Calcareous
- E... Eluviated
- SZ... Solonchets
- GL... Gleyed
- CU... Cumulic
- A... Alkaline

GENETIC MATERIAL

- A... Anthropogenic
- C... Colluvial
- E... Eolian
- F... Fluvial
- L... Lacustrine
- M... Morainal (Till)
- R... Bedrock
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- m... mottled
- r... ridged

TEXTURE

- 0... Gravel
- 1... Sand
- 2... Loamy Sand
- 3... Sandy Loam, Fine Sandy Loam
- 4... Loam, Silt Loam, Very Fine Sandy Loam
- 5... Silty Clay Loam, Clay Loam
- 6... Silty Clay, Clay, Sandy Clay
- 7... Heavy Clay

SLOPE CLASS

- 1 0 - 0.5
- 2 0.5 - 2
- 3 2 - 5
- 4 6 - 9
- 5 10 - 15
- 6 16 - 30

PERCENT SLOPE

- Level
- Nearly Level
- Very gentle slope
- Gentle slope
- Moderate slope
- Strong slope

TERMINOLOGY

- Level
- Nearly Level
- Very gentle slope
- Gentle slope
- Moderate slope
- Strong slope

DEPTH TO GROUNDWATER

- W₁ >2
- W₂ 1-2
- W₃ <1

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- R₁ S₁ >3
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- R₃ S₃ 1-2
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- - significant occurrence
- - range
- - minor occurrence

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- - land class boundary
- - field boundary
- - investigation boundary
- - slough or wetland
- D.L. - disturbed land
- - open water
- - coulee or low area
- - drain
- + 22 - section corner and number

NOTE: FOR PLANNING PURPOSES ONLY, NOT FOR OBTAINING WATER RIGHTS.

Alberta AGRICULTURE
RESOURCE PLANNING DIVISION

IRRIGABLE LAND INVENTORY IN SOUTHERN ALBERTA

LAND IRRIGABILITY CLASSIFICATION LEVEL III
PINCHER CREEK WEST AREA

T.T. R 30 W 4M

SCALE 1:40 000

DATE 1987-03-31

SUBMITTED

DATE 12/10/87

APPROVED

DATE Mar. 10, 1987

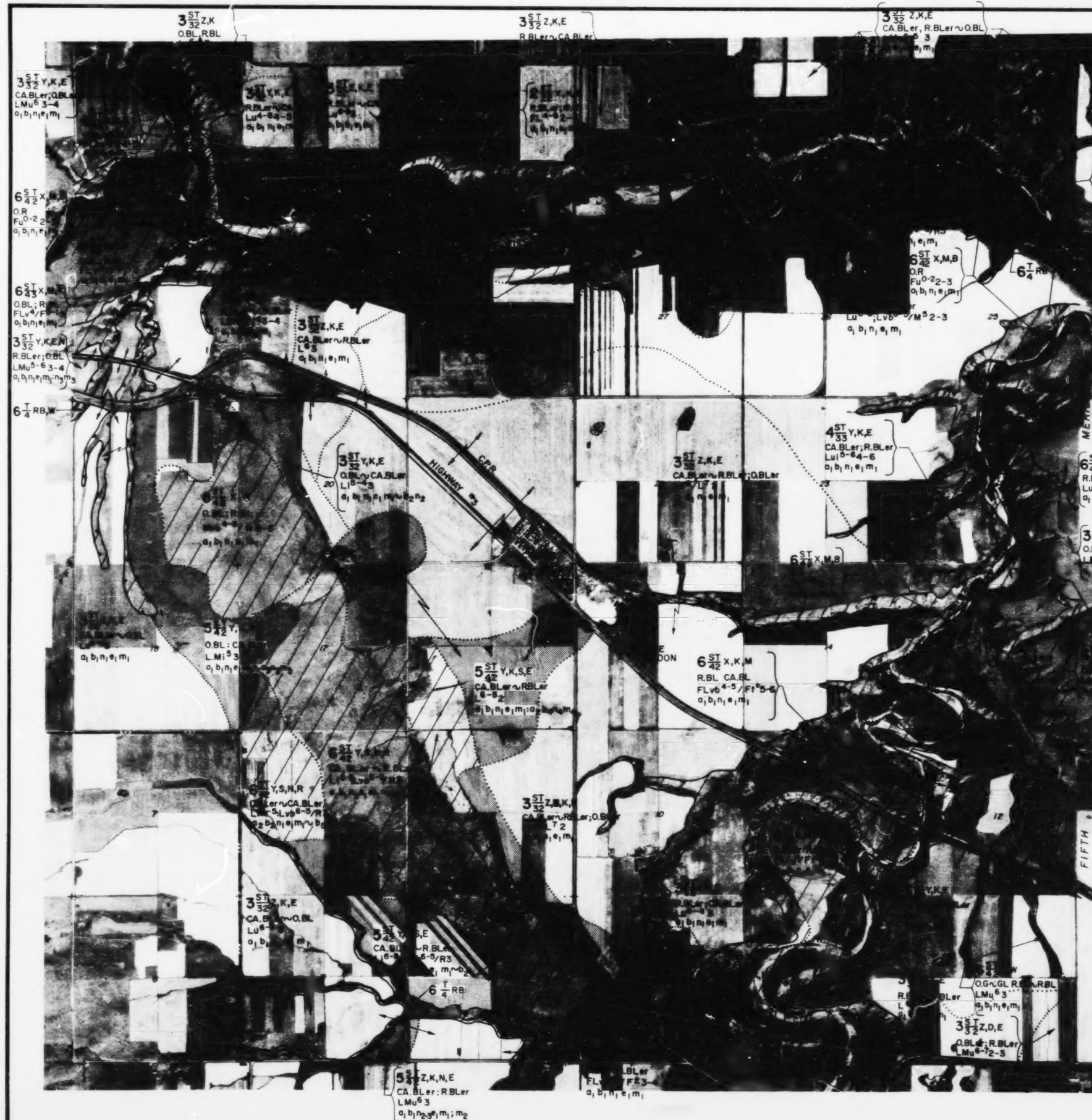
DESIGNED ALBERTA AGRICULTURE

DRAWN B.V.D.F., M.D.

DWG. No. Y-201-LI-18

SHEET 3 OF 8 FILE No. 9346

Prepared by
Hardy BIST Limited



STATISTICAL SUMMARY					
LAND CLASS-Acres(hectares)			LAND CLASS-Acres(hectares)		
1	0	101	4	100	(40)
2	120	(50)	5	1490	(600)
3	10430	(4220)	6	9560	(3870)

LEGEND	
SOIL SYMBOL	TOPOGRAPHY SYMBOL
LAND CLASS	LIMITING FACTORS
SOIL CATEGORY	DRAINABILITY
	TOPOGRAPHY CATEGORY

Soil Taxonomy	Soil Phase
Soil Textural Class	Soil Phase
Genetic Material	Slope Class
Surface Expression	Other Factors
	Soil Chemistry

LAND CLASSES

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SOIL CATEGORIES	TOPOGRAPHY CATEGORIES	DRAINABILITY
1. Irrigable-Excellent	1. Irrigable-Gravity	X. Moderately to rapidly permeable
2. Irrigable-Good	2. Irrigable-Sprinkler	Y. Slowly permeable
3. Irrigable-Fair	3. Irrigable-Special System Design	Z. Relatively impermeable
4. Non-irrigable	4. Non-irrigable	

SOIL LIMITATIONS	TOPOGRAPHY LIMITATIONS
D... low permeability/undesirable structure	F... surface drainage
R... shallowness to bedrock	G... steep slopes
K... shallow profile development	J... field size, shape
N... sodicity	B... brush/tree cover
W... excessive wetness	RB... rough broken
S... salinity	U... earth moving
M... low moisture holding capacity	P... stoniness
E... erosion damage	
I... periodic flooding	

SOIL TAXONOMY	SOIL PHASES	GENETIC MATERIAL
B... Brown	alk... alkaline	A... Anthropogenic
DB... Dark Brown	calc... calcareous	C... Colluvial
DG... Dark Grey	carb... carbonated	E... Eolian
BL... Black	er... eroded	F... Fluvial
G... Gleysol	gr... gravelly	L... Lacustrine
HG... Humic Gleysol	li... lithic	M... Morainal (Till)
R... Regosol	sa... saline	R... Bedrock
HR... Humic Regosol	st... stony	S... Saprolite (Residual)
SZ... Solonch		U... Undifferentiated
SS... Solodized Solonch		
SO... Solod		

SURFACE EXPRESSION	TEXTURE	SLOPE CLASS	PERCENT SLOPE	TERMINOLOGY
a... apron	0... Gravel	1	0 - 0.5	Level
b... blanketed s. steep	1... Sand	2	0.5 - 2	Nearly Level
f... fan	2... Loamy Sand	3	2 - 5	Very gentle slope
h... hummocky u. undulating	3... Sandy Loam, Fine Sandy Loam	4	6 - 9	Gentle slope
i... inclined v. veneered	4... Loam, Silty Loam, Very Fine Sandy Loam	5	10 - 15	Moderate slope
l... level	5... Silty Clay Loam, Clay Loam	6	16 - 30	Strong slope
m... rolling	6... Silty Clay, Clay, Sandy Clay			
r... ridged	7... Heavy Clay			

DEPTH TO GROUNDWATER	DEPTH TO BEDROCK(R) OR SAPROLITE(S)	SALINITY AND SODICITY	ABUNDANCE DESIGNATIONS
CATEGORY DEPTH(m)	CATEGORY DEPTH(m)		
W ₁ >2	R ₁ S ₁ >3	a... salinity between 0 to 0.5m	~ - nearly equal occurrence
W ₂ 1-2	R ₂ S ₂ 2-3	b... salinity between 0.5 to 1m	- - significant occurrence
W ₃ <1	R ₃ S ₃ 1-2	n... sodicity between 0 to 1m	- - range
	R ₄ S ₄ <1	e... salinity between 1 to 2m	- - minor occurrence
		m... sodicity between 1 to 2m	

MAP SYMBOLS		
----- land class boundary	----- slough or wetland	----- coulee or low area
----- field boundary	----- disturbed land	----- drain
----- investigation boundary	----- open water	+ 22 - section corner and number

NOTE: FOR PLANNING PURPOSES ONLY, NOT FOR OBTAINING WATER RIGHTS.

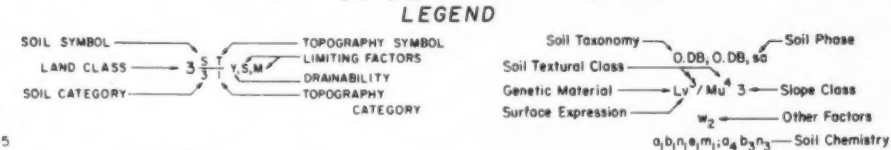
Prepared by
Hardy EBT Limited

Alberta AGRICULTURE RESOURCE PLANNING DIVISION	
IRRIGABLE LAND INVENTORY IN SOUTHERN ALBERTA	
LAND IRRIGABILITY CLASSIFICATION LEVEL III	
PINCHER CREEK WEST AREA	
SCALE 1:40 000	DATE 1987-03-31
SUBMITTED	DESIGNED ALBERTA AGRICULTURE
DATE Mar 10 1987	DRAWN B.V.D.F.M.D.
APPROVED Ben Karkhanavich	DWG. No. Y-201-LI-18
DATE Mar 10 1987	SHEET 4 OF 8
	FILE No. 9348



STATISTICAL SUMMARY

LAND CLASS	Acres (hectares)	LAND CLASS	Acres (hectares)
1	0 (0)	4	0 (0)
2	0 (0)	5	0 (0)
3	2110 (855)	6	7460 (3020)



- LAND CLASSES**
- 1: Excellent capability with no significant limitations for irrigation.
 - 2: Good capability with moderate limitations for irrigation.
 - 3: Fair capability with moderately severe limitations for irrigation.
 - 4: Restricted capability requiring a special system design and/or special management.
 - 5: Non-irrigable pending detailed investigation, implementation of an improvement and/or undergoing reclamation. Land within this class may be upgraded to an irrigable class or will be rated Class 6.
 - 6: Non-irrigable

- SOIL CATEGORIES**
- 1. Irrigable-Excellent
 - 2. Irrigable-Good
 - 3. Irrigable-Fair
 - 4. Non-Irrigable
- TOPOGRAPHY CATEGORIES**
- 1. Irrigable-Gravity
 - 2. Irrigable-Sprinkler
 - 3. Irrigable-Special System Design
 - 4. Non-Irrigable
- DRAINABILITY**
- X: Moderately to rapidly permeable
 - Y: Slowly permeable
 - Z: Relatively impermeable

- SOIL LIMITATIONS**
- D: low permeability/undesirable structure
 - R: shallowness to bedrock
 - K: shallow profile development
 - N: sodicity
 - W: excessive wetness
 - S: salinity
 - M: low moisture holding capacity
 - E: erosion damage
 - I: periodic flooding
- TOPOGRAPHY LIMITATIONS**
- F: surface drainage
 - G: steep slopes
 - J: field size, shape
 - B: brush/tree cover
 - RB: rough broken
 - U: earth moving
 - P: stoniness

- SOIL TAXONOMY**
- B: Brown
 - DB: Dark Brown
 - DG: Dark Grey
 - BL: Black
 - G: Gleysol
 - HG: Humic Gleysol
 - R: Regosol
 - HR: Humic Regosol
 - SZ: Solonchets
 - SS: Solonchets
 - SO: Solonchets
- SOIL PHASES**
- O: Orthic
 - R: Rego
 - CA: Calcareous
 - E: Eluviated
 - SZ: Solonchets
 - GL: Gleysol
 - C: Cumulic
 - A: Alkaline
- GENETIC MATERIAL**
- A: Anthropogenic
 - C: Colluvial
 - E: Eolian
 - F: Fluvial
 - L: Lacustrine
 - M: Morainal (Till)
 - R: Bedrock
 - S: Saprolite (Residual)
 - U: Undifferentiated

SURFACE EXPRESSION	TEXTURE	SLOPE CLASS	PERCENT SLOPE	TERMINOLOGY
a... apron	0... Gravel	1	0 - 0.5	Level
b... blanketed	1... Sand	2	0.5 - 2	Nearly Level
f... fan	2... Loamy Sand	3	2 - 5	Very gentle slope
h... hummocky	3... Sandy Loom, Fine Sandy Loom	4	6 - 9	Gentle slope
i... inclined	4... Loom, Silt Loom, Very Fine Sandy Loom	5	10 - 15	Moderate slope
l... level	5... Silty Clay Loom, Clay Loom	6	16 - 30	Strong slope
m... rolling	6... Silty Clay Loom, Sandy Clay			
r... ridged	7... Heavy Clay			

DEPTH TO GROUNDWATER OR SAPROLITE (S)	SALINITY AND SODICITY	ABUNDANCE DESIGNATIONS
W ₁ >2	R ₁ S ₁ >3	a... salinity between 0 to 0.5m
W ₂ 1-2	R ₂ S ₂ 2-3	b... salinity between 0.5 to 1m
W ₃ <1	R ₃ S ₃ 1-2	n... salinity between 0 to 1m
	R ₄ S ₄ <1	s... salinity between 1 to 2m
		m... salinity between 1 to 2m

- MAP SYMBOLS**
- -land class boundary
 - -field boundary
 - -investigation boundary
 - -slough or wetland
 - D.L. -disturbed land
 - -open water
 - -coulee or low area
 - -drain
 - + 22 -section corner and number

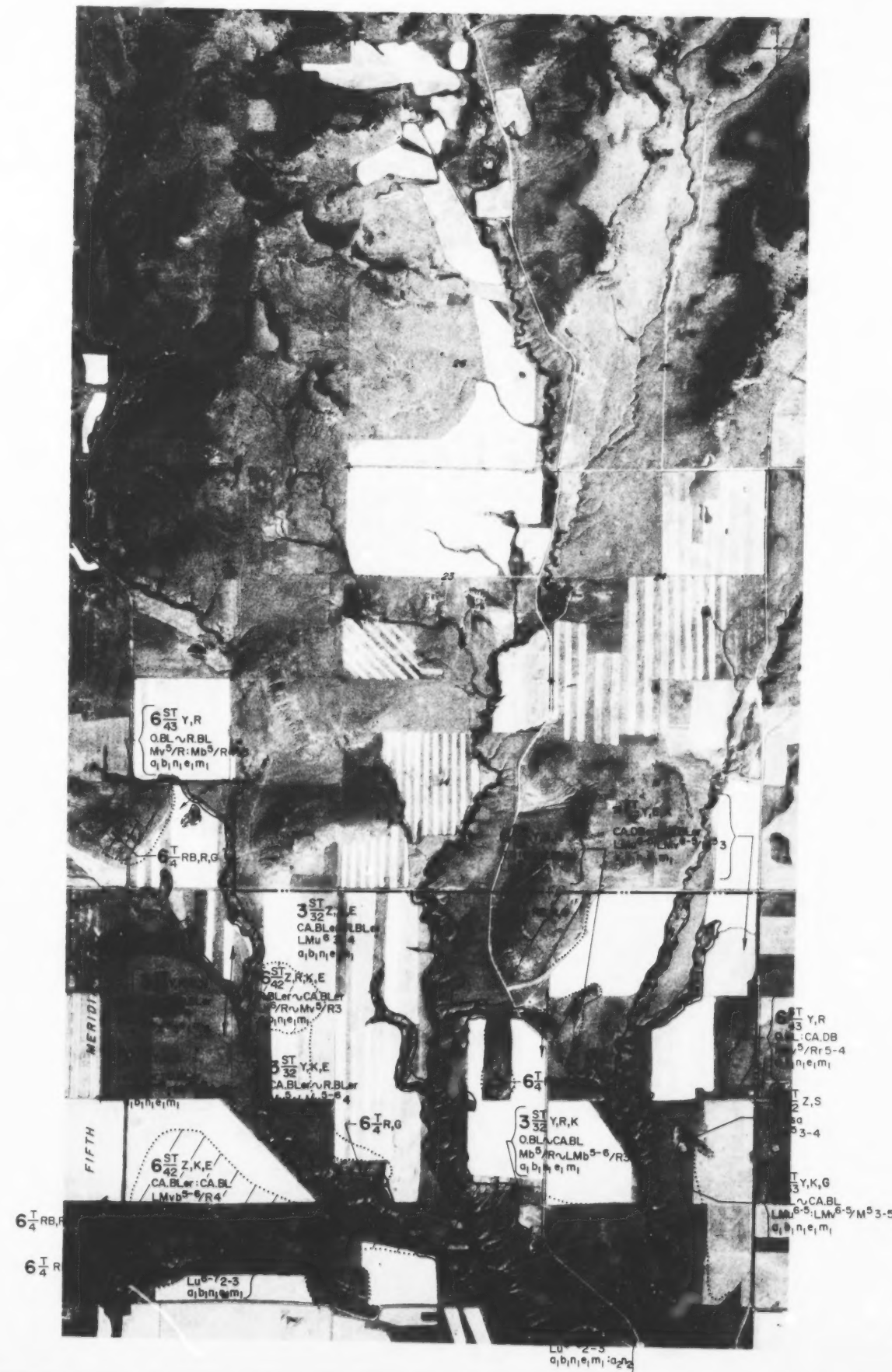
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Alberta
 AGRICULTURE
 RESOURCE PLANNING DIVISION

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LAND IRRIGABILITY CLASSIFICATION LEVEL III
PINCHER CREEK WEST AREA

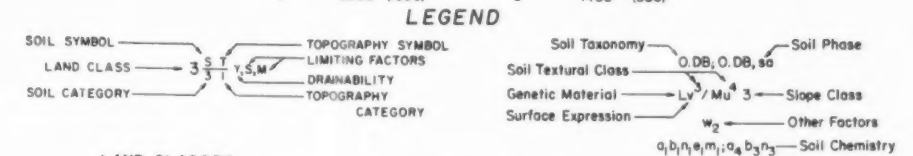
SCALE 1:40 000	DATE 1987-03-31
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DATE May 10 1987	DRAWN B.V., D.F., M.O.
APPROVED	DWG. No. Y-201-LI-18
DATE Mar 10, 1987	SHEET 5 OF 8
	FILE No. 9348

Prepared by
Hardy GIST Limited



STATISTICAL SUMMARY

LAND CLASS-Acres(hectares)	LAND CLASS-Acres(hectares)
1 0 (0)	4 80 (30)
2 0 (0)	5 30 (10)
3 2550 (1030)	6 1430 (580)



LAND CLASSES

- 1: Excellent capability with no significant limitations for irrigation.
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SOIL CATEGORIES

- 1: Irrigable-Excellent
- 2: Irrigable-Good
- 3: Irrigable-Fair
- 4: Non-Irrigable

TOPOGRAPHY CATEGORIES

- 1: Irrigable-Gravity
- 2: Irrigable-Sprinkler
- 3: Irrigable-Special System Design
- 4: Non-Irrigable

DRAINABILITY

- X: Moderately to rapidly permeable
- Y: Slowly permeable
- Z: Relatively impermeable

SOIL LIMITATIONS

- D: low permeability/undesirable structure
- R: shallowness to bedrock
- K: shallow profile development
- N: sodicity
- W: excessive wetness
- S: salinity
- M: low moisture holding capacity
- E: erosion damage
- I: periodic flooding

TOPOGRAPHY LIMITATIONS

- F: surface drainage
- G: steep slopes
- J: field size, shape
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SOIL TAXONOMY

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- R: Regosol
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- SZ: Solonetz
- SS: Solodized Solonetz
- SO: Solod

SOIL PHASES

- alk: alkaline
- calc: calcareous
- carb: carbonated
- er: eroded
- gr: gravelly
- li: lithic
- sal: saline
- st: stony

GENETIC MATERIAL

- A: Anthropogenic
- C: Colluvial
- E: Eolian
- F: Fluvial
- L: Lacustrine
- M: Morainal (Till)
- R: Bedrock
- S: Saprolite (Residual)
- U: Undifferentiated

SURFACE EXPRESSION

- a: apron
- b: blanketed
- f: fan
- h: hummocky
- i: inclined
- l: level
- m: rolling
- r: ridged

TEXTURE

- 0: Gravel
- 1: Sand
- 2: Loamy Sand
- 3: Sandy Loam, Fine Sandy Loam
- 4: Loam, Silt Loam, Very Fine Sandy Loam
- 5: Silty Clay Loam, Clay Loam
- 6: Silty Clay, Clay, Sandy Clay
- 7: Heavy Clay

SLOPE CLASS

PERCENT SLOPE

TERMINOLOGY

- 1 0 - 0.5 Level
- 2 0.5 - 2 Nearly Level
- 3 2 - 5 Very gentle slope
- 4 6 - 9 Gentle slope
- 5 10 - 15 Moderate slope
- 6 16 - 30 Strong slope

DEPTH TO GROUNDWATER OR SAPROLITE (S)

- | CATEGORY | DEPTH(m) |
|----------------|----------|
| W ₁ | >2 |
| W ₂ | 1-2 |
| W ₃ | <1 |

DEPTH TO BEDROCK(R) OR SAPROLITE (S)

- | CATEGORY | DEPTH(m) |
|----------------|----------|
| R ₁ | >3 |
| R ₂ | 2-3 |
| R ₃ | 1-2 |
| R ₄ | <1 |

SALINITY AND SODICITY

- a: salinity between 0 to 0.5m
- b: salinity between 0.5 to 1m
- n: sodicity between 0 to 1m
- s: salinity between 1 to 2m
- m: sodicity between 1 to 2m

ABUNDANCE DESIGNATIONS

- ~: nearly equal occurrence
- : significant occurrence
- : range
- : minor occurrence

MAP SYMBOLS

- land class boundary
- field boundary
- investigation boundary
- slough or wetland
- disturbed land
- open water
- coulee or low area
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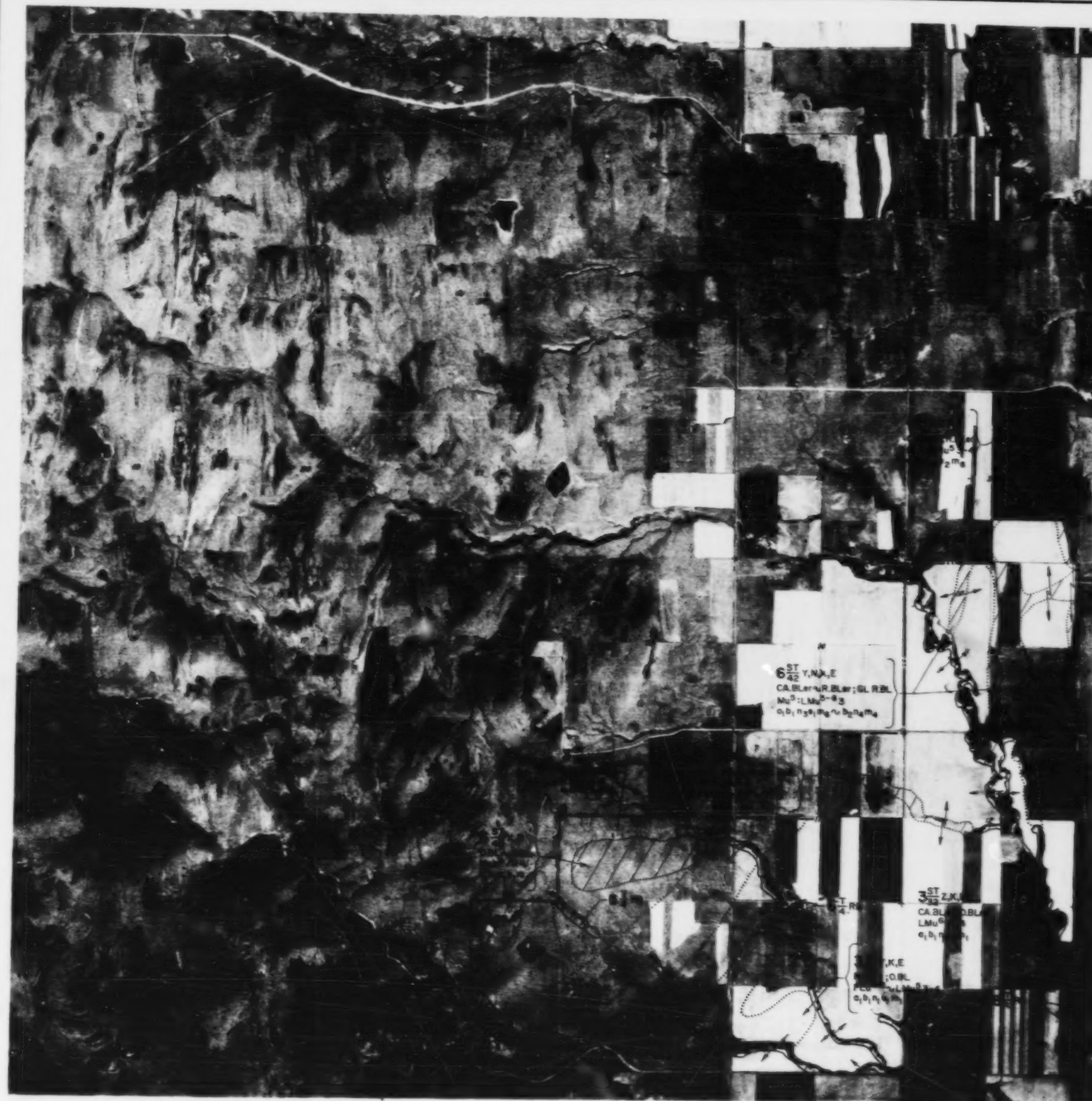
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Prepared by
Hardy BST Limited



Prepared By
 Hardy Eddy Limited

Alberta AGRICULTURE
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 DATE: [Date]
 APPROVED: [Signature]
 DATE: Mar 10, 1987

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 DRAWN: B.V., D.F., M.D.
 DWG. No: Y-20-LI-18
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 FILE No: 9331